

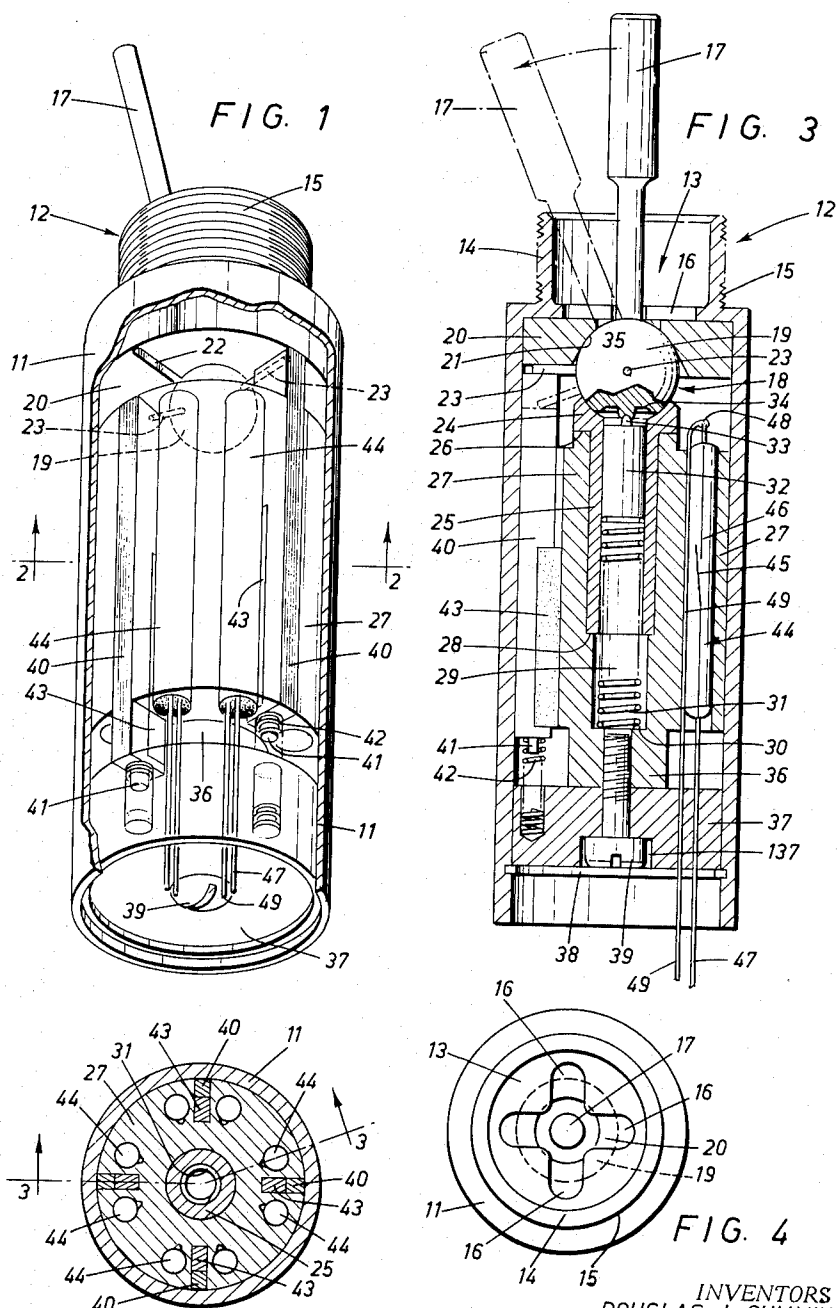
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PERMANENT MAGNETIC REED SWITCH

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PERMANENT MAGNETIC REED SWITCH

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This invention relates to a circuit controller or switch for controlling a plurality of circuits and has particular reference to a circuit controller for controlling a plurality of circuits each incorporating a sealed switch.

In recent years there has been increased use in circuits such as transistor circuits of switches comprising flexible reed contacts formed of ferromagnetic material which are encased in a glass bulb filled with inert gas to combat interference in operation due to moisture and dirt; these reed switches have the property that they are normally closed when they are in a magnetic field of a certain strength. Due to limitations in space it would clearly be an advantage to assemble such switches together and control them by means of a unitary circuit controller but problems have been experienced in controlling the operation of the switches each with respect to the other.

It is an object of the invention to provide a circuit controller or switch which selectively controls the on and off operation of an assembly of sealed switches, each having contacts of ferromagnetic material.

In the instant invention the circuit controller device consists of a manually operated guided detent member provided with rigid pins, each operable on a respective one of a plurality of biased movable permanent magnets; a plurality of reed switches are mounted in fixed relation to the guided detent member and in such a way that a selected number of reed switches are effected by an individual permanent magnet. In one position of the guided detent member all the reed switches are acting in the same manner, but on movement of the detent member one of the rigid pins contacts its respective movable permanent magnet to change the action of its associated reed switches while leaving the other reed switches unaffected. The detent member has a snap action and is provided with a positive lock to maintain its engagement with the selected biased magnet.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawing forming a part hereof, in which:

FIGURE 1 is a fragmentary perspective view of one specific embodiment of the invention and serves to illustrate the general arrangement of a switch in accordance with the present invention;

FIGURE 2 is a plan sectional view taken on the lines 2-2 of FIGURE 1;

FIGURE 3 is a side sectional view taken on the lines 3-3 of FIGURE 2;

FIGURE 4 is a top view of the specific embodiment of the invention shown in FIGURE 1;

Referring now to the drawing, a circuit controller or switch in accordance with the present invention comprises a casing 11 having at one end an inwardly extending flange 12 which defines a central aperture 13; on flange 12 there is an axially extending collar 14, the outer surface of which has threads 15 to provide a suitable means for mounting the casing 11 in a cabinet or to a support, not shown.

From the central aperture 13 spaced apart channels 16 branch radially outwards and they provide a means for governing the movement of a handle portion 17 of a manually operable switch actuator 18. Handle 17 extends through the central aperture 13 to terminate in a spherical portion 19. The flange member 12 bears against a ball

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socket member 20 which has its opposed surfaces in contact with the adjacent inner surfaces of casing 11 and flange 12; the ball socket member 20 has an internal spherical seat 21 which engages the opposed upper surface of the spherical portion 19 of the manual operable actuator 18. As better illustrated in FIGURE 1 the ball socket member 20 has on the under surface spaced apart slots 22 leading outward from the spherical seat 21. In this embodiment as with all contemplated embodiments these slots 22 correspond in number with the channels 16 of the flange member 12. The spherical portion 19 of the actuator member 18 is provided with spaced apart pins 23 corresponding in number and spacing to the slots 22, the pins 23 being dimensioned so that each is movably located in one of the slots 22.

The lower part of the spherical portion 19 is seated in a ball socket abutment 24 provided at the end of a cylinder 25 axially disposed in the casing 11. The cylinder 25 is maintained in position by engagement of the lower side of the ball socket abutment 24 against a flange 26 provided at the upper end of an intermediate casing 27. The wall of the intermediate casing 27 bears against the inner wall of the casing 11. The end of the intermediate casing 27 adjacent the flange 26 terminates short of the lower side of the ball socket member 20 to provide space for unimpeded rotational movement of the spherical portion 19 and its associated pins 23.

The end of the cylinder 25 remote from the ball socket abutment 24 bears against a flange 28 provided in a bore 29 of the intermediate casing 27. The lower end of the bore 29 is provided with another flange 30 which provides a seat for a spring 31 which extends upwards through the bore 29 into the cylinder 25. The upper end of spring 31 bears against a movable rod 32 provided with a nipple 33 at its upper end. As shown more particularly in FIGURE 3 the lower surface of the spherical portion 19 is provided with a recess 34. A projection 35 is centrally disposed in the recess 34, the seat of projection 35 is shaped to engage with nipple 33 when the handle portion 17 is in the position shown in solid outline. On movement of the handle 17 to the position illustrated in dotted outline the nipple 33 snaps over into the recess 34 since spring 31 is normally biased against rod 32.

The lower end of the intermediate casing 27 is provided with a collar 36 having reduced external diameter as illustrated. The collar 36 bears against an end closure member 37 which is secured in a fixed relationship to the casing 11 by means of a spring clip 38; the end closure member 37 is provided with a recessed aperture 137 which accommodates the head of a screw 39, the shank of which engages with a thread provided internally of the collar 36.

As illustrated more particularly in FIGURES 1 and 3 a plurality of yokes 40 are disposed longitudinally in channels in the intermediate casing 27. Each yoke 40 is positioned so that its upper end registers against the edges of a respective one of the slots 22 of the spherical portions 19. The yokes 40 are movable in the intermediate casing 27 and are biased to register against the edges of the slots 22 by providing each with a pin 41 at its lower end which registers with a spring 42 seated in a recess provided in the closure member 37. Each yoke 40 carries a magnet 43 on its inner longitudinal surface.

As illustrated more clearly in FIGURES 2 and 3 each yoke 40 with its associated magnet 43 is positioned between a pair of reed switches 44, each having reed contacts 45 and 46; the magnet 43 is located in the yoke 40 so as to afford the requisite excitation of the reeds 45 and 46 of its associated pair of reed switches 44. The reed switches 44 are frictionally engaged in cavities provided in the intermediate casing 27 which may be conveniently constructed of plastic through which the cavities are previously drilled to accommodate the reed switches 44. A

terminal 47 is connected at the lower end of each reed switch 44 to the reed 45 and the terminal 47 extends outward of the casing 11 through the end closure member 37 which again may be conveniently constructed of plastic in which the terminal 47 is subsequently sealed. The upper end of each reed switch 44 has a terminal 48 connected to the reed 46. Each reed switch 44 controls an individual circuit completed in the intermediate casing 27 by means of a conductor 49 which passes through the closure member 37 in sealed relation and then upwards through the cavity provided in the respective reed switch 44 to join the upper terminal 48.

In the full line position of the operable handle 17 illustrated in FIGURE 3, all the reed switches 44 are conductive or non-conductive depending on the location of the magnets 43 in relation to the reed switches 44. Movement of the manually operable handle 17 into one of the channels 16, illustrated by the dotted line position, causes the spherical portion 19 to rotate with the result that the selected pin 23 travels downwards from its associated slot 22 and applies pressure to the upper end of the yoke 40 bearing against the edge of the particular slot 22, thus causing the enclosed magnet 43 to be lowered; this results in an alteration in the magnetic pull on the reeds 45 and 46 of the pair of switches 44 associated with the lowered magnet 43 whereas the remaining reed switches 44 are unaffected. By moving the manual operable handle 17 into any one of the other channels 16 other pairs of grouped reed switches 44 can be selectively switched without alteration of the remainder.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

We claim:

1. A circuit controller comprising a plurality of sealed switches each having contacts of ferromagnetic material, means supporting said plurality of switches in spaced apart relationship, a plurality of permanent magnets disposed in said supporting means, whereby a selected number of said sealed switches are magnetically responsive to one magnet only, each magnet being slidably disposed in an individual plane with means biasing each of said magnets to alter its magnetic effect on said selected number of sealed switches, a plurality of guide means in said support means, manually operable means movable in said plurality of guide means and a plurality of detent means on said manually operable means aligned in the planes of movement of said magnets, the movement of said manually operable means in one of said guide means being effective to move one of said detent means against a respective one of said magnets leaving the others unaffected.

2. A circuit controller comprising a casing, a plurality of reed switches fixedly mounted in said casing, a plurality of permanent magnets mounted in said casing, each magnet being disposed to affect only a selected number of said reed switches with each magnet being movable in an individual plane between two locations to alter the action of said selected number of reed switches, means biasing said magnets towards one of said locations, rotatable means mounted in said casing, a plurality of guide means on said casing, handle means to said rotatable means projecting outwardly of said casing and movable in said plurality of guide means, spaced apart arm means on said rotatable means, said arm means being aligned in the planes of movement of said magnets whereby on movement of said handle means in one of said guide means one of said arm means moves against the respective one of said magnets leaving the others unaffected.

3. A circuit controller comprising a casing having a wall with a centrally disposed aperture, a plurality of reed switches fixedly mounted in said casing normal to said

wall, each reed switch having a pair of ferromagnetic contacts, a plurality of permanent magnets mounted in said casing substantially parallel to said reed switches, each magnet being disposed to affect only a selected number of reed switches with each magnet being movable in an individual plane between two locations to alter the position of the contacts of said selected number of reed switches, means biasing said magnets towards one of said locations, said wall limiting the biased movement of said magnets, rotatable means mounted in said casing, handle means extending through said aperture and terminating in said rotatable means, a plurality of channels extending radially of said aperture in said wall, spaced apart arms on said rotatable means aligned in the planes of movement of said magnets whereby on movement of said handle means into one of said channels one of said arm means moves against the respective one of said magnets leaving the others unaffected.

4. A circuit controller comprising a casing having a wall with a centrally disposed aperture, a plurality of reed switches fixedly mounted in said casing normal to said wall, each reed switch having a pair of ferromagnetic contacts, a plurality of permanent magnets mounted in said casing normal to said wall, each magnet being disposed to affect only a selected number of reed switches with each magnet being movable in an individual plane between two locations to alter the position of the contacts of said selected number of reed switches, means biasing said magnets towards one of said locations, said wall limiting the biased movement of said magnets, rotatable means mounted in said casing, handle means extending through said aperture and terminating in said rotatable means, a plurality of channels extending radially of said aperture in said wall, spaced apart arms on said rotatable means aligned in the planes of movement of said magnets whereby on movement of said handle means in one of said channels one of said arm means moves against the respective one of said magnets leaving the others unaffected, and slots on the inner face of said wall extending radially of said aperture, said slots being aligned with said magnets and each dimensioned to receive one of said arm means to permit movement therein.

5. A circuit controller comprising a casing having a wall with a centrally disposed aperture, a plurality of reed switches fixedly mounted in said casing normal to said wall, each reed switch having a pair of ferromagnetic contacts, a plurality of permanent magnets mounted in said casing substantially parallel to said reed switches, each magnet being disposed to affect only a selected number of reed switches with each magnet being movable in an individual plane between two locations to alter the position of the contacts of said selected number of reed switches, means biasing said magnets towards one of said locations, said wall limiting the biased movement of said magnets, rotatable means in said casing, means supporting said rotatable means against said aperture, handle means extending through said aperture and terminating in said rotatable means, a plurality of channels extending radially of said aperture in said wall, spaced apart arms on said rotatable means aligned in the planes of movement of said magnets whereby on movement of said handle means in one of said channels one of said arm means moves against the respective one of said magnets leaving the others unaffected, and slots on the inner face of said wall extending radially of said aperture, said slots being aligned with said magnets and each dimensioned to receive one of said arm means to permit movement therein.

6. A circuit controller according to claim 5 wherein said means supporting said rotatable means comprises a cylinder axially disposed in said casing between said magnets, a shoulder on the end of said cylinder opposed to said wall and a ball socket on said abutment seating said rotatable means.

7. A circuit controller comprising a casing having a wall with a centrally disposed aperture, a plurality of

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reed switches fixedly mounted in said casing normal to said wall, each reed switch having a pair of ferromagnetic contacts, a plurality of permanent magnets mounted in said casing substantially parallel to said reed switches, each magnet being disposed to affect only a selected number of reed switches with each magnet being movable in an individual plane between two locations to alter the position of the contacts of said selected number of reed switches, means biasing said magnets towards one of said locations, said wall limiting the biased movement of said magnets, rotatable means in said casing, means supporting said rotatable means against said aperture, handle means extending through said apertures and terminating in said rotatable means, a plurality of channels extending radially of said aperture in said wall, spaced apart arms

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on said rotatable means aligned in the planes of movement of said magnets whereby on movement of said handle means in one of said channels one of said arm means moves against the respective one of said magnets leaving the others unaffected, slots on the inner face of said wall extending radially of said aperture, said slots being aligned with said magnets and each dimensioned to receive one of said arm means to permit movement therein and locking means for said handle means when said magnets are in either of said two locations.

No references cited.

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